Before You Begin to Write . . .

- What is your motivation for writing the paper?
- What is the purpose of this paper?
- Who is the audience for this paper?
- How significant is the information?
  - How widely should it be disseminated?
  - How rapidly should it be disseminated?
  - How important is a permanent archival record?

Possible motivations
- To achieve fame and fortune; to get promoted
- To disseminate your results to other workers in your field
- To provide a permanent archival record of your work
- To establish precedence by publishing before your competitors can
- To propose a new program or area of research

Appropriate purposes:
- Reporting original, significant research results
- Documenting methods or establishing standards
- Warning of a hazardous condition
- Examining the feasibility of a project
- Reinterpreting previously reported results
- Reviewing the literature
- Providing an overview of the topic

Who is the audience?
- What are their needs, interests, and level of knowledge?
Choosing an Appropriate Venue

- Publish in the most suitable periodical
- Publish in the most prestigious journal
  *ISI Journal Citation Reports*
- Reach the widest interested audience
  *Ulrich’s Periodicals Directory*
  http://www.ulrichsweb.com/UlrichsWeb/
- Achieve publication as quickly as possible
- Be flexible in your choice of journal

Ulrich’s has circulation figures for ~250,000 serials, periodicals, annuals, and newspapers worldwide.

Reasons for flexibility:

Several journals may have the same readership but different policies for subject emphasis and length of articles. You must find the best fit with your paper.

Some journals publish faster; e.g. if a journal has scheduled a number of special issues, publication of your ms. will be delayed for months.

Editorial trends; editors develop preferences for “hot” topics, to the exclusion of others. If a journal has just published two special issues on your topic, the editor may not be interested in another long paper on that issue. Consult recent issues of your first choices, or write to the editor to enquire about his interest in your topic.
Consider the reader’s wants and needs.

Peer-reviewed journals—originality of the concept and significance of the work; advantages are peer-review and prestige

Technical trade magazines—new technologies, with emphasis on utility and near-term applications; advantages are relatively quick publication, wide distribution, possible payment for article

Conference proceedings—presenting a paper at a conference allows direct interaction with audience

Company reports—*IBM J. of Research and Development, Science & Technology Review* (LLNL)

Suppose you’ve designed a new carbon fiber composite automotive component that is stronger and cheaper to manufacture than the steel component it will replace. It just so happens that it is also 20 percent lighter. Although the original engineering motivation for the CFC component was not really weight reduction, because of the current angst over high fuel costs, you will capitalize on reader interest if you mention the fuel savings attendant on switching to the new component.
Matching the Readers’ Interests

- Look at what the publication says its readers’ interests are:
  
  *Computing in Science and Engineering* tells authors: *CiSE’s readers are researchers, developers, and practitioners involved in computational aspects of various scientific and engineering disciplines, as well as educators, especially those developing curricula for this new interdisciplinary field.*

- Examine tables of contents of representative issues (scope and technical level)

- Consult the editor

- Read the “Call for Papers”

Journal of Architectural Engineering

• practice-based information on the engineering and technical issues concerned with all aspects of building design.

• topics related to buildings such as planning and financing, analysis and design, construction and maintenance, codes applications and interpretations, conversion and renovation, and preservation.

IEEE Sensors Journal

The journal focuses on the theory, design, fabrication, manufacturing and applications of devices for sensing and transducing physical, chemical and biological phenomena with emphasis on the electronics and physics aspects of sensors and integrated sensor-actuators. *Papers on sensor applications are of special interest.*


Three optical detection methods--confocal laser (scanning) microscopy, wide-field microscopy with highly sensitive CCD-cameras, and near-field microscopy--and atomic force microscopy methods are the topics.
The Publication Process

- Paper is submitted to the publisher
- Editorial review
- External peer review
- Referees suggest or mandate revisions
- Revised manuscript is submitted
- Editor accepts paper for publication
- Manuscript is copy-edited and typeset
- Author reviews/corrects galley proofs
- Paper is published

Author submits manuscript to editor
Editor determines if the paper is appropriate:
  - Represents new and significant work
  - Is scientifically sound
  - Falls within the journal’s topical coverage
If the paper does not meet all of these criteria, it is rejected and returned without review
If the paper meets the criteria, the editor selects qualified referees and sends them each a copy of the paper for review
Reviewers provide written comments on:
  - The technical soundness of the paper
  - Mistakes and omissions
  - Additional work to be referenced
  - Suggestions for clarification, deletion of superfluous material, or other improvements
Reviewers also make a confidential recommendation to the editor:
  - Accept paper as written
  - Recommend optional changes
  - Require mandatory changes
  - Reject paper
If the reviewers suggest changes, the editor returns the manuscript to the author, along with the anonymous reviewers’ reports, and requests revisions
The author makes the requested changes, additions, or deletions, and returns the revised manuscript to the editor
The editor determines that the author has satisfactorily complied with the reviewers’ requirements and accepts the paper.
Peer Review

- Independent recommendations of recognized experts in the field ("reviewers" or "referees")
- Reviewers are expected to offer objective and constructive criticism
- Reviewers are anonymous and are expected to maintain strict confidentiality
- Process should produce better papers
- Author benefits from insight and suggestions of experts
Components of a Tech Paper

- Title
- Abstract
- Background and Introduction
- Technical Description
- Results
- Discussion
- Conclusions
- Acknowledgments
- References
- Special Sections, if needed
Order in Which They’re Written

- Technical Description
- Results
- Discussion
- Conclusions
- Background and Introduction
- References
- Abstract
- Title
- Acknowledgments
- Special Sections, if needed
Organizing Your Paper

- What are the key ideas?
- What are the supporting ideas?
- What details should be included?
- What background information does the reader need to understand the paper?
- What is the emphasis?
- How long should the manuscript be?
- What illustrations and data are needed? How should they best be presented?

Emphasis:

- the data
- the method
- the interpretation
- your recommendations
- potential applications
The model is for a paper submitted to an archival technical journal. For a conference proceedings, which are usually page-limited, you would eliminate most of the introduction and the background information on heat pipes and concentrate on the pumped single-phase porous media heat exchangers (PMHXs).

For a trade magazine, design methods, materials specifications, and performance data would be of most interest. The theoretical section on thermal hydraulics and the appendix could probably be eliminated.

For an internal report, you would probably replace the abstract with brief summary of key points for the executive reader, provide a greatly expanded introductory section, and include a rationale for the design approach and costs associated with the design.
Technical Narrative

- Describe the work in *detail*
  - Describe the apparatus, computer codes, or other devices used in the work
  - Identify materials used and give specifications
  - Describe procedures in detail
  - Give adequate parametric detail
  - Emphasize any hazards, e.g. toxicity, radiation hazards, biohazards, explosive tendencies
  - Include sufficient mathematical detail to reproduce derivations and check numerical results
  - Include all background data, equations, and formulae necessary to the arguments
Results

- Present only relevant data
  - Emphasize results achieved, not history
  - Identify obvious dead-ends
- Describe statistical treatment of data, if any
- Use tables to organize and summarize numerical data
- *Give sufficient detail to justify your conclusions*
Discussion

- Point out key features of the work
- Compare the results to prior work, both the authors’ and others’
- Interpret and explain the meaning of the results
- Describe prospective applications
- State honestly the limitations of the work
Conclusions

• Evaluate the results from the standpoint of the original objectives of the work
  ▶ What has been contributed?

• State the logical implications of the results
  ▶ Do they suggest directions for future study?
  ▶ Do they support development of technological applications?
  ▶ Do they identify a dead end that should be abandoned?
Summary

- Is used only for very long papers—more than 25–30 pages—or for reports
- Include highlights from the Introduction, Results, Discussion, and Conclusions sections
Background and Introduction

- State the purpose of the work
- Give a concise background of the problem being studied
- Relate the work described to prior work, both the authors’ and others’
- Describe the experimental or theoretical basis for the work
- Explain the significance, scope, and limitations of the work
- Indicate the technical contents to follow
References

- Include only references that are specifically cited in the text
- Cite the reference at the end of the phrase or sentence in which it is first mentioned [Elliott, 1998]
- Conform to the publication’s established style for references
Check References for . . .

- Conformance to the journal’s specific manuscript preparation instructions
- Accuracy of all information
- Some editors will not accept references to unpublished material, private communications, obscure proceedings, or other sources not readily accessible to readers
Special Sections

- Material that supplements the text should be placed in a special section or sections following the references, so as not to disrupt or obscure the logic of the presentation

- Appropriate material for special sections:
  - List of abbreviations
  - Glossary of special terms
  - List of symbols or mathematical terms
  - Lengthy or supplemental background material
  - Mathematical derivations
Abstract

- Every article submitted to a technical journal or meeting proceedings must have an abstract
- Three types of abstracts
  - Descriptive
  - Informational
  - Combined
- The type and length of the abstract is specified by the editor or publisher

Three types of abstracts:

**Descriptive**: states the general subject matter and describes in a qualitative way the document’s contents.

**Informational**: highlights the findings and results briefly and quantitatively; does not include discussion or interpretation.

**Combined**: gives specific information about the principal findings and results and general information about the rest of the document.

Remember that the abstract will be used in two different situations:

1) It provides a useful overview for someone who is beginning to read your paper.
2) It identifies your contribution for someone who is using an information-retrieval service.

A poorly written abstract discourages both kinds of readers from reading your full paper.
Every Abstract Must Contain . . .

- A concise statement of the *problem* studied
- A brief explanation of the *approach* used
- A succinct description of the *principal results* obtained
Abstract Checklist

- Subject of the paper is stated immediately
- Scope and objectives of the work are identified
- Significant findings are summarized
- Results are emphasized
- Methods and operational ranges are specified
- All abbreviations are defined
- All equations are rendered linearly
- No references are cited
- No mention is made of figures, tables or equations used in the main text
- No figures or tables of any kind are included
The Title

- Make the title *descriptive* and *interesting*
  - Worst title I have ever seen:
    *Towards the Observation of Signal over Background in Future Experiments*
- Put key words *first*
- Restrict the title to a maximum of 12 words
- Avoid unfamiliar acronyms or abbreviations
Put Key Words First

Original Title
- Application of the time-dependent local density approximation to conjugated molecules
- A novel approach to estimate the stability of one-dimensional quantum inverse scattering

Better Title
- Time-dependent local density approximation for conjugated molecules
- Novel stability estimation for 1D quantum inverse scattering
Other alternatives for Example #1:
- Ti, Zr, and Hf oxides for microelectronic devices
- Chemical vapor deposition of Ti, Zr, and Hf oxides
- Carbon-free precursor for Hf dioxide synthesis
All of the elements of quality contribute to the overall merit of a S&E manuscript. Technical content is not enough; nor can elegant literary style compensate for sloppy experiments or outmoded theory.

Validity and Significance:

Some authors assume that describing their S&E efforts is sufficient and that the beauty of the results will speak for themselves, i.e. that a discussion of the work’s significance is superfluous. However, the quality of any S&E publication is enhanced by a brief recapitulation of its significance. A busy reader will recognize the value of a brief discussion of the implications of the work.
Quality Technical Content

- Data is error-free and valid; any selection or statistical treatment of data is disclosed
- Sufficient detail is provided so that peers can reproduce the experiment
- Figures and tables present information clearly and unambiguously
- Assumptions are clearly stated and supported
- Alternative approaches or interpretations are discussed
Quality Writing

- Ideas are presented clearly and unambiguously
- Language is precise and concise
- Main points are emphasized and readily identifiable
- Mistakes in grammar, spelling, punctuation, and standard (U.S.) English are absent
Deciding on the Author(s)

- Ethical considerations of sharing credit with those who contributed to the work
- Choice of co-authors may affect the paper’s real and perceived quality
- Things to consider when selecting co-authors
  - Importance of the individual’s contribution
  - Writing ability, availability, and interest
  - Prestige and recognition in the field
- Co-authors may not necessarily be co-writers

Generally, have those who contributed most to the success of the project, especially those who have solved major technical problems should be co-authors; lesser contributors are mentioned in the acknowledgments section.

Order of authors: preferred method is to name authors in descending order of their relative contributions. Most readers will assume the first author made the major contributions to the work.
Assigning Credit

- Ahrends (postdoc) and Anderson (engineer) who actually did the work
- Arbeiter (engineer) who fixed a critical problem
- Bartholomew (group leader)—formulated the key idea, told $A^2$ what experiment to do, what to look for, and what it meant when they found it
- Chambers (laboratory head and internationally known theorist)—had a number of insightful discussions with Bartholomew
- Daniels (technician)—prepared and characterized the super-pure thin films

Semiconductor nanocrystals to take advantage of their tunable opto-electronic properties

The transport and dynamics of charge carriers through thin films of colloidal CdSe (cadmium/selenium)

Chambers contributed several possible theoretical explanations to account for the unexpectedly long charge carrier lifetimes that were observed experimentally.

Deciding the lead author is nontrivial; do you make it the most senior person, or the person who contributed the most important idea, or the person who did most of the work? Think about how future authors will cite it. “The process pioneered by xxxx et al.”

In addition, Ahrends is a screw-up who stuck Anderson with most of the exacting work; Chambers, who can be petty and vindictive, has an ego the size of an aircraft carrier; and Daniels, the only one of the group who doesn’t have a Ph.D., has a permanent chip on his shoulder because he feels under-appreciated and overworked.

Solve problem with multiple publications: Chambers can be lead author on a theoretical paper to Phys. Rev. Lett.; Arends can be lead author on a paper
Acknowledgments*

- Acknowledge contributions by professional colleagues who are not listed as authors—do not include titles or academic degrees
- Acknowledge financial support in this section, or in a footnote on the first page of the text, depending on the journal’s style
- Do not include purely personal acknowledgments

* N.B. There is no e between the g and the m in the spelling of acknowledgment in U.S. English.
Advantages of Multiple Authors

- Subject is too large or too complex for one person
- Subject requires a variety of viewpoints or expertise
- Recognized “experts” add prestige
Complications

- Opposing judgments about manuscript length, emphasis, publication venue
- Differing writing styles
- Disputes about assignment of credit
- Time needed to resolve differences
- Dilution of responsibility
Collaborative Styles

- One author writing for someone else
- One author writing for a group
- Multiple authors preparing individual segments of a larger document
- Multiple authors writing the entire document

Some caveats:
The more people involved
  - The more time it takes
  - The less any one person feels responsible for finishing
  - The more coordination and integration is required

Multiple authors make it difficult to maintain consistent tone, style, word usage.

Joining individually written segments in one document can result in a disorganized, poorly written document unless one person has editorial control.

Many authors preparing the entire document is least efficient and most time-consuming.
Team-Writing Guidelines

- Name a lead author who has editorial control
- Limit the size of the team
- Strive for a mix of “thinkers” and “doers”
- Decide who has veto power
- Discuss how to handle conflict

Limit the size of the team--eliminate upfront members who cannot, or will not, contribute.

Consider mentioning some contributors in the “acknowledgments” section instead of making them co-authors.
Manuscript Preparation

- Follow the “Instructions to Authors”
  - Formatting requirements and typing instructions
  - Requirements for figures and tables
  - Number of copies required
  - Mailing instructions

- Consult the editor before writing the article
  - For review papers for journals
  - For technical trade magazines

- Contact the program organizer for proceedings
  - Limitations of scope
  - Criteria for acceptance
General Guidelines

- Follow the journal’s style
  - Numbering and capitalization of subheadings
  - Form of call-outs¹ and references, footnotes, figure captions, and table titles

- Print the manuscript double-spaced, single-sided, with generous margins

- Provide a title page
  - Complete title
  - Names and institutional affiliations of all co-authors
  - Contact information for corresponding author

³
General Guidelines, continued

- Print figures and tables on separate pages, one per page
- Figures, tables, and references should be numbered and called out consecutively in the text
- Equations
  - Place on separate lines of text
  - Number along the right margin of the page in consecutive order
- Number all pages
Include a Transmittal Letter

- Address it to the editor
- State the name of the journal to which your manuscript is being submitted
- Include a statement that the work described is your original work and that the manuscript is not being considered for publication elsewhere
- Provide complete contact information for the corresponding author
Sample Title Page
Title
Affiliations
Submission Date
Authors
Journal
Contact Info for Corresponding Author

Half Metallic Magnets
Warren E. Pickett\textsuperscript{1} and Jagadees S. Moodera\textsuperscript{2}
\textsuperscript{1} Department of Physics
University of California, Davis
\textsuperscript{2} Francis Bitter Magnet Laboratory
Massachusetts Institute of Technology

submitted to Physics Today
20 December 2000

Please direct correspondence to:
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Department of Physics
University of California, Davis
One Shields Avenue
Davis, CA 95616
Phone: (530) 752-1500
Fax: (530) 752-4717
Dealing with Referees

- The referee’s job is to maintain the quality of the journal and to protect your professional reputation
- Consider all referee comments carefully and objectively, even if the editor does not insist on revisions
- Give more weight to specific objections than generic criticism
- Refute technical objections by adding explanatory information

Helpful, specific criticism:
“In Fig. 4, the labels on the axes appear to have been transposed” vs. “the manuscript is poorly written”
Your Alternatives

- Accept the referees’ remarks and make the changes
- Ask for clarification of the referees’ remarks
- Rebut the referees’ remarks and request a second review or arbitration
- Withdraw the paper from further consideration
Submitting a Revised Ms.

- Refer to the original manuscript number assigned by the publisher
- If the title has been changed, give the original title and date of submission
- Include a detailed statement of what has been changed, added, or deleted in response to referees’ comments
- Provide complete contact information for the corresponding author
Withdrawing a Paper

- If the revisions required by the referees are too extensive, an author may withdraw the paper
- The editor should be informed of requests to withdraw
- The withdrawn paper may be submitted to another journal
Avoiding Strategic Mistakes\textsuperscript{1}

- Failure to consider reader interests and level of technical knowledge
- Choice of inappropriate publication
- Poor choice of co-authors
- Inadequate literature search
- Errors in technical emphasis
- Failure to obtain constructive criticism from colleagues prior to submission


Do not underestimate the value of a comprehensive literature search \textit{before} writing your ms; doing so will help to:

- Put your work in the context of others’ work in the field
- Help you to demonstrate why your approach is an improvement
- May change your points of emphasis, if you discover obvious omissions in the literature
- Will save you from wastefully duplicating others’ work if you have nothing to add
- Will establish your credibility with editors and referees—the ms. that reveals a lack of insight about prior work brands the author as careless, ignorant, or indifferent to important developments in his subject published elsewhere
Forms of Illustration

- Drawings—details, motions, function, cross or cutaway sections
- Diagrams and schematics—processes, symbolic representations, successive steps in time
- Charts—numerical data, comparisons, trends, relationships among variables
- Photographs—actual views of objects
Line Drawings

- Can show detail that would not appear in a photograph
- Effective line drawings emphasize important features and omit unnecessary details
- Important to provide a scale or frame of reference

• Important to provide a scale or frame of reference
A right circularly polarized beam of light of intensity $I_0=1.2 \text{ W/m}^2$ propagates in the $+z$ direction and encounters a series of three linear polarizers as shown in the diagram.
Drawbacks to certain kinds of charts:

- Bar charts do not show data clearly when the differences between categories are slight.
- Line charts may not show the data clearly if the coordinate scales are not sufficiently precise.
- Pie charts show relative proportions but are inadequate to show a large number of small percentages.
- Surface charts are suitable only to depict gradual changes and are not suitable if any of the curves overlap.

In any of these cases, it would be better to present precise numerical data in tabular form.
Photographs

- Provide photographs, not negatives or slides
- Glossy finish, high contrast, sharp definition
- Black and white preferable; consult editor before including color photographs
- Labels or scales to be added at printing
  - Print them on a separate sheet of paper
  - Indicate their placement on a sketch or photocopy
- Identify each photograph on the back with the corresponding figure number
- If necessary, indicate which edge is the top
Effective Illustrations

- Provide the right amount of technical detail
- Are clearly related to ideas presented in the text
- Highlight the strongest and most interesting points of the narrative
- Are placed conveniently near the point in the narrative where they are explained or discussed
Reductions

- Most printers ask for submission of full-size figures, one per page, which are then considerably reduced in the printed paper.
- Particular attention should be given to:
  - **Lettering**—at least 18 pt.
  - **Lines**—at least 2 pt.
  - **Symbols**—at least 16 pt.
  - **Small components or details**—must still be identifiable if reduced by half.
Figure Captions

- Every figure must have a stand-alone caption
- Captions are placed below the figure in camera-ready manuscripts and in a separate, numbered list for typeset manuscripts
- Original, *reproducible* artwork (laser prints, photos, line drawings)—not photocopies—must be provided to the publisher
Label Every Element of a Figure

Figure 7. The Nike laser system uses both discharge pre-amplifiers and e-beam pumped amplifiers. (Image courtesy US Naval Research Lab, Plasma Physics Division, Nike KrF Laser Program.)
Label Both Axes of All Graphs

Figure 8. The 1-D spherical target designs predict target gains of 100–300 for a few-MJ laser. (*Image courtesy US Naval Research Lab, Plasma Physics Division, Nike KrF Laser Program.*)
Numbering Figures

- Figures must be numbered consecutively in order of their appearance in the text.
- Use Arabic numerals and the word “figure” to denote captions, e.g. Figure 1, Fig. 23.
  - “Figure” may be abbreviated in the text, e.g. “See Fig. 7,” but should be written out at the beginning of the caption itself.
  - “Figure” should be capitalized when combined with a numeral to form the name or title of a specific figure, e.g. “Temperature variation is shown in Fig. 3.”
Formal Tables

- Use to present precise numerical data
- Arrange the data to show trends or reveal relationships
- Anchor all data to first column on the left
- Provide a clear, concise heading for each column; a unit of measure is not sufficient
- No cells should be blank; indicate “data not taken” by a raised ellipsis (⋯)
Informal Tables

- Categorize technical information
- Itemize important points
- Show steps in a process
- List specific characteristics
Table Titles and Numbering

- Each table must have a stand-alone title
- The title is placed above the table
- Tables are numbered in consecutive order as they are referred to in the text
- Use a consistent numbering style for all tables (Roman or Arabic numerals)
Column Headings for Tables

• Each column in a table must have a clear and concise heading that identifies the data
• The first word of a heading is capitalized
• The units of measure in which the data are given are placed in parentheses, e.g. (MeV) or (µm), on the line below the column heading
• Units of measure alone are not sufficient for column headings
Presentation of Tabular Data

- Units of measure should be used that give values near unity, such that powers of ten are not needed for most entries
- SI units of measure should be used
- Columns of numbers should be aligned by the decimal point
- A raised ellipsis (⋯) should be used to indicate “data not taken”
Footnotes Used in Tables

- Use superscript Roman letters in alphabetical order, e.g. a, b, c, to number footnotes in a table, beginning again with a for subsequent tables
- Footnote callouts are ordered from left to right across the top row, then left to right across the second row
- Footnotes themselves are placed outside and just beneath their respective tables, not at the bottom of the page of text
- Nonstandard abbreviations or symbols used in tables may be defined in footnotes
Tabular data must be arranged so that it is understandable, and relationships are clearly revealed. This table—as submitted by the author—is hard to read and understand, it is not numbered, and it contains typographical errors.

<table>
<thead>
<tr>
<th>Used target</th>
<th>Reactivity difference, $\beta_{eff}$</th>
<th>Initial reactivity, $\beta_{eff}$</th>
<th>Energy yield, MJ</th>
<th>Width $\mu$s</th>
<th>Period $\mu$s</th>
<th>Evolution time, $\mu$s</th>
<th>Initial power from LIU 10, MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.3 g/cm² Ta + 18.0 g/cm² Pb</td>
<td>+0.045 (0.003)</td>
<td>1.060 (0.003)</td>
<td>0.47 (0.04)</td>
<td>1615 (10)</td>
<td>480 (10)</td>
<td>3240 (20)</td>
<td>0.84 (0.1)</td>
</tr>
<tr>
<td>3.3 g/cm² Ta + 18.0 g/cm² Pb</td>
<td>+0.045 (0.003)</td>
<td>1.184 (0.003)</td>
<td>0.22 (0.04)</td>
<td>490 (5)</td>
<td>125 (5)</td>
<td>1046 (10)</td>
<td>1.9 (0.1)</td>
</tr>
<tr>
<td>3.3 g/cm² Ta + 18.0 g/cm² Pb</td>
<td>+0.045 (0.003)</td>
<td>1.27 (0.003)</td>
<td>1.90 (0.06)</td>
<td>325 (5)</td>
<td>96 (5)</td>
<td>742 (10)</td>
<td>4.1 (0.1)</td>
</tr>
<tr>
<td>3.3 g/cm² Ta + 4.0 g/cm² Be</td>
<td>+0.187 (0.003)</td>
<td>1.065 (0.003)</td>
<td>0.58 (0.01)</td>
<td>1450 (10)</td>
<td>425 (10)</td>
<td>3260 (20)</td>
<td>0.46 (0.1)</td>
</tr>
<tr>
<td>Electron Beam</td>
<td></td>
<td>1.055 (0.003)</td>
<td>0.48 (0.04)</td>
<td>1610 (10)</td>
<td>480 (10)</td>
<td>2940 (20)</td>
<td>1.4 (0.1)</td>
</tr>
<tr>
<td>With LIU 10 OU shielding by reflector</td>
<td>-0.14 (0.003)</td>
<td>1.25 (0.003)</td>
<td>1.85 (0.04)</td>
<td>360 (5)</td>
<td>80 (5)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table V. GIR Fission Pulse Parameters

<table>
<thead>
<tr>
<th>Target</th>
<th>Reactivity disturbance$^a$ (l eff)$^b$</th>
<th>Initial reactivity$^c$ (l eff)$^d$</th>
<th>Energy yield, (MJ)</th>
<th>Pulse width, (μs)</th>
<th>Period, (μs)</th>
<th>Evolution time, (μs)</th>
<th>Initial power$^e$ from LIU10, (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TaPb</td>
<td>+0.045</td>
<td>1.060</td>
<td>0.47 ± 0.04</td>
<td>1615 ± 10</td>
<td>480 ± 10</td>
<td>3240 ± 20</td>
<td>0.84</td>
</tr>
<tr>
<td>TaPb</td>
<td>+0.45</td>
<td>1.184</td>
<td>0.33 ± 0.02</td>
<td>490 ± 5</td>
<td>125 ± 5</td>
<td>1046 ± 10</td>
<td>1.9</td>
</tr>
<tr>
<td>TaPb</td>
<td>+0.045</td>
<td>1.27</td>
<td>1.90 ± 0.06</td>
<td>325 ± 5</td>
<td>96 ± 2</td>
<td>742 ± 10</td>
<td>4.1</td>
</tr>
<tr>
<td>TaBe</td>
<td>+0.187</td>
<td>1.065</td>
<td>0.58 ± 0.01</td>
<td>1450 ± 10</td>
<td>425 ± 10</td>
<td>3260 ± 20</td>
<td>0.46</td>
</tr>
<tr>
<td>Electron Beam</td>
<td>0</td>
<td>1.055</td>
<td>0.48 ± 0.04</td>
<td>1610 ± 10</td>
<td>480 ± 10</td>
<td>2940 ± 20</td>
<td>1.4</td>
</tr>
<tr>
<td>LIU 10 OUI</td>
<td>-0.14</td>
<td>1.25</td>
<td>1.85 ± 0.04</td>
<td>300 ± 5</td>
<td>80 ± 5</td>
<td>. . .</td>
<td>. . .</td>
</tr>
</tbody>
</table>

$^a$Margin of Error = ± 0.003
$^b$l eff=0.067
$^c$Margin of Error = ± 0.1
$^d$Shielding by reflector

The use of footnotes and chemical notation, as shown, simplifies and clarifies tabular data.
Revising Your Manuscript

- Editing for content
- Editing for style
- Proofreading for form
Editing for Content

- Information is correct and complete
- Information is appropriate for the audience and the purpose
- Information is acceptable for distribution
Editing for Style

- Information is organized logically
- Transitions and reader cues are used
- Emphasis is proper and appropriate
- Language is clear and concise
- Graphics and tabular data are clear and appropriate
Present Ideas Clearly

- Reveal underlying relationships of ideas and data
- Make descriptions precise and unambiguous
- State assumptions and inferences explicitly and provide supporting evidence
- Provide reader cues and transitional statements
- Avoid gaps in logic or unwritten assumptions
Organize Reports to Reveal Main Points

- Reader should be able to grasp main points immediately
  - Provide an abstract or overview
  - Organize information logically
    - In chronological order
    - In order of importance
  - Use headings, bulleted items, and lists to emphasize major points
  - Summarize main points in the conclusion
Provide Reader Cues

- Section headings
  - “Porous media heat exchangers”*
    - Heat Sinks
    - Heat Pipes
      - Low-Temperature Heat Pipes
      - High-Temperature Heat Pipes

- Transitional statements
  - “It is useful to compare the results of the fatigue tests with ultimate heat flux failure tests …”

- Summary statements
  - “In summary, testing and analyses conducted on two porous metal heat exchangers clearly show the technical feasibility of using helium-cooled devices…”

Provide Logical Transitions

- One paragraph ends with:
  - “... because of interference by backscattering, the current procedure is very inexact.”

- Begin the next paragraph with:
  - “Greater precision may be achieved by . . .”

- The logical connection between the two paragraphs is made clear by repeating the idea of precise measurement.
Use Language Precisely

- Use a good dictionary and thesaurus
- Define terms (acronyms, symbols)
- Avoid meaningless flowery phrases
- Spell out acronyms on first usage
- Make antecedents of pronouns clear
  - Non-commutative geometry is obtained when the latter equation fails and is replaced by another equation, as in the case of the quantum Hall system. The interpretation of this effect in superstrings is startling, however, because it is a fundamental theory of spacetime, and it means that we cannot think of spacetime in terms of ordinary smooth geometry, as in general relativity.
Avoid Naked “This”es

“In some pellet designs, the average ionic charge, $Z$, and the laser intensity, $I$, are large enough that the distribution function is predicted to be non-Maxwellian (flat-topped). *This* has important consequences: reduction of the absorption rate, electron heat flux, and modification of the continuum X-ray emission rates.”

Avoid naked “this”es and “that”s

Because the “this” stands alone, instead of pointing to a specific referent, it creates ambiguity. Does the “this” in this example refer to “pellet designs,” “$Z$ and $I$, or the non-Maxwellian distribution? Or in the case of some writers, none of the above?
Avoid Ambiguities of Semantics and Syntax

- “A sintered composition for the experimental heating rod was prepared of a mixture of stainless steel with 23 percent zinc. This element proved to be unsatisfactory.”
- “Absenteism rates and health insurance costs could be reduced by supplying ergonomic chairs for clerical workers with wide seats and higher backs.”

Semantics—the indirect relation between words and meaning; note that words have different connotations in different contexts; e.g. “displacement”
- to a physicist—the effect that the wavelength at which a black body radiates the most energy is inversely proportional to its absolute temperature
- to a mechanical engineer—the volume displaced by the stroke of a piston
- to a seismologist—a geological fault
- to a marine engineer—the weight of the water displaced by a vessel floating in it
- to a pharmacist—percolation
- to a botanist—abnormality in the position or form of a leaf or organ
- to a psychologist—a defense mechanism in which an emotion is transferred to another, more acceptable object

Syntax is the arrangement of words in a sentence.
Brevity: A Key Goal of Revising

- Strategies for revising for brevity and clarity:
  - Use short sentences, < 20 words
  - Keep verbs close to nouns
  - Limit the number of modifying clauses
  - Eliminate unnecessary words
  - Replace wordy expressions with simple words
  - De-nounify verbs
  - Use positives—not negatives—to express ideas

*Illustration only, does not represent actual data.
Profread—proofred—proofread!

- Be aware of the special pitfalls for technical proofreaders
  - $\infty$ or $\alpha$
  - ‘ or ’ or 1

- Tips for proofreading technical material
  - Proofread from a hard copy
  - Proofread backwards
  - Proofread everything—not just the narrative
  - Allow enough time
  - Use a spellchecker, and check every highlighted word
For Further Reading . . .